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## Structure Types and Terminology

Kimberly Williams **KANSAS STATE UNIVERSITY**

THE *Fred C. Gloeckner* FOUNDATION, INC.



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## Topics

- Definitions
- Structural terminology



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## Greenhouse

Tower Greenhouse, Hanover, Germany

Manhattan, KS





Univ. Minnesota (built 1963)

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## Greenhouse

- Structure for growing plants that is:
  - Covered with transparent material (glazing) to admit natural light



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## Greenhouse

- Structure for growing plants that is:
  - Covered with transparent material (glazing) to admit natural light
  - Is artificially heated



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## Greenhouse

- Structure for growing plants that is:
  - Covered with transparent material (glazing) to admit natural light
  - Is artificially heated
  - Is tall enough for people to walk in



## Glasshouse



## Hobby Greenhouse



## Retractable roof greenhouse



## Hotbed

- Artificially-heated but not tall enough for people to work in



## Cold frame

- Not heated or minimally heated
- May or may not be tall enough for people to work in



## High tunnels Hoop houses

- Unheated, single-layer plastic-covered structures
- Crops grown in ground beds
- Structure may be moveable
- Extend production seasons



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### High tunnels in S. Europe



Campo de Cartegena, Southern Spain

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### Saran house Shade structure

- Usually have no sides
- Shade cloth reduces light intensity
- Provides protection from wind
- Not artificially heated




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### Greenhouse range

- Two or more greenhouses in one location

Single-span



Multi-span



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### Headhouse / Crosshouse / Service building

- Building associated with greenhouse
- Multi-purpose
  - Stage shipping
  - Cooler
  - Pesticide storage
  - Employee break room




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### Headhouse / Crosshouse / Service building

- Used for operations that support production
- Not used for production



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### Lean-to

- One side of greenhouse is solid wall
- Hobby and school greenhouses




### Sawtooth

- Roof (rafters of individual house) slopes in only one direction and is connected along side posts



### Even-span

- Two roof slopes of same pitch and width



### Uneven-span

- Rafters are of unequal length, which makes structure adaptable to hill



### Arched roof vs. Gable roof (A-frame)



### Quonset vs. Gothic



### Greenhouse ranges

Ridge and furrow



Gutter-connected

### Single-span vs. Multi-span

- Advantages and Disadvantages?

Single-span

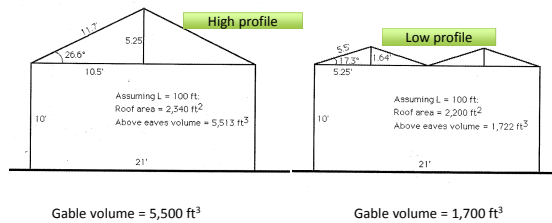


Multi-span

### What would you call this structure? Why?



### High profile vs. Low profile



### High profile



Distance between gutters is wide, usually > 15'  
Slightly cheaper to cool, but more expensive to heat



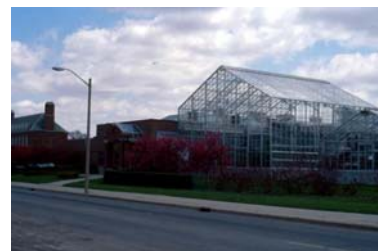
### Low profile



Distance b/n gutters is short, about 11-12'

Slightly cheaper to heat, but more expensive to cool

### High profile or low profile?



Conservatory Plant Sciences Cntr  
Univ. of Illinois  
Urbana, IL

### High profile or low profile?



"The White House"  
Schaefer's Greenhouses  
Aurora, IL



### Purlins and Sash bars

Sash bar



Purlin

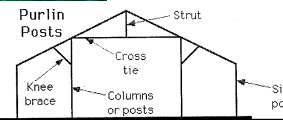


Laying panes on sash bars

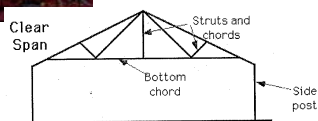
Caulking between sash bar and bar cap



### Purlin posts



### Truss frame



### Truss frame – Poly glazing



Sterling poly greenhouse



### Cost of high tunnel construction

Item	PVC Frame	Metal Frame
Structure w/cover	\$0.75-1.00/ft <sup>2</sup>	\$1.00-2.50
Labor to erect	\$0.50	\$0.50
Heating system	--	--
Cooling system	--	--
Plumbing/wiring	--	--
<b>Subtotal</b>	<b>\$1.25-1.50</b>	<b>\$1.50-3.00</b>



### Cost of greenhouse construction

Item	Polyethylene	Glass
Structure w/cover	\$3.50-4.50/ft <sup>2</sup>	\$7.00-8.00
Labor to erect	\$2.00-2.50	\$2.50
Heating system	\$1.00-1.50	\$1.00-1.50
Cooling system	\$1.50-2.50	\$1.50-2.50
Plumbing/wiring	\$2.50	\$2.50
<b>Subtotal</b>	<b>\$10.50-11.50</b>	<b>\$14.50-16.00</b>



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